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JOINT CEMENT COMPOSITIONS

Armand J. Desmarais, New Castle, Del., assignor to
Hercules Incorporated, Wilmington, Del.

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3 Claims

ABSTRACT OF THE DISCLOSURE

Joint cements suitable for use with plaster wallboard are disclosed wherein the asbestos customarily used to impart water binding properties and pseudoplasticity is replaced by a water-insoluble, fibrous hydroxyethyl cellulose.

This invention relates to compositions useful as joint sealing materials for the installation of wallboard paneling in, e.g., residential and office building construction. More specifically, it refers to such compositions wherein a cellulose derivative is employed to impart desirable properties thereto.

Since the end of the second World War, the use of wallboard has all but displaced plaster in erection of interior walls in the construction of buildings. Wallboard is generally installed in 4 x 8 foot panels which are nailed and glued to the studding of the wall and fitted together until the entire section of wall is covered. The joints where sections of the board are butted together are covered with tape and then taped joints and all nails are covered with a joint cement or "spackling" compound which, upon hardening, can be sanded smooth so that it is imperceptible under paint or wallpaper.

Joint cements heretofore employed with wallboard have contained a resinous binder, limestone, clay, mica and asbestos the principal ingredients which are mixed with water to form a dope. Asbestos is included in these formulations for several purposes. It imparts lubricity, workability, water binding, and pseudoplasticity to the wet mix and, being fibrous, provides reinforcement of the cement on drying.

Recently disclosed evidence that certain types of asbestos may have carcinogenic characteristics has prompted issuance of severely restrictive regulations by OSHA regarding its use in construction applications and may eventually lead to its being banned altogether. For this reason, an effort is now under way to find substitutes to replace asbestos in most of its present applications.

In recent work by the instant inventor, it has been found that cellulose derivatives can be used as a replacement for asbestos in joint cement. More specifically, this invention relates to joint cement compositions based on a resinous binder, mica, clay, and limestone as major dry components, along with a fibrous, water-insoluble hydroxyethyl cellulose having an M.S. between about 0.15 and 1.4. Joint cements are marketed in fully formulated, ready-to-use form, i.e., already containing water, and as a dry powder to which water is added at the time of use. The invention includes such dry powders as well as the fully formulated cements. Joint cement compositions of this invention are substantially identical in performance to those which are presently available commercially and, based on current price levels, they are competitive in price.

In commercial practice the concentrations of the principal ingredients can and do vary widely between suppliers and depending on the intended end use, i.e., whether it is for patching holes, covering nail pops, or for initially

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covering taped joints. Most commercial formulations are within the following concentration ranges:

Calcium carbonate, 190 to 350 parts by weight.

Mica, 30 to 90 parts by weight.

5 Clay, 0 to 100 parts by weight.

Binder, 20 to 44 parts by weight.

If the product is to be sold as a ready-mix formulation, water in the amount of about 30 to 40%, based on the total weight of the dry ingredients, is added and thoroughly mixed. All compositions within the limits just described are suitable for manual application by troweling. When they are to be applied mechanically, additional water is added at the job site just prior to use.

10 The cellulose derivatives which can be employed in this invention are water-insoluble, fibrous materials as distinguished from the conventional fibrous hydroxyethyl cellulose of commerce which is water-soluble. Water insolubility is assured either by maintaining the M.S. at a low level, i.e., below about 1.2, or by the use of hydroxy-ethylation techniques which produce a nonuniformly substituted product. The water insolubility is a critical factor in the performance of the hydroxyethyl cellulose as an asbestos substitute. A water-soluble material such as conventional hydroxyethyl cellulose, at economical concentration levels, would not impart the consistency needed for the pseudoplasticity normally obtained with asbestos.

20 The above paragraph must not be taken to mean that no water-soluble hydroxyethyl cellulose is to be employed. Water-soluble hydroxyethyl cellulose is frequently included as a thickener in limestone based joint cements and can be so used in the compositions of this invention. It is only the hydroxyethyl cellulose employed in substitution for asbestos that need be water insoluble.

25 To duplicate properties of conventional joint cements, the concentration of the water-insoluble hydroxyethyl cellulose can be from about an equal quantity to $\frac{1}{2}$ that of the asbestos being replaced, depending on the M.S. of the hydroxyethyl cellulose used. If the M.S. of the hydroxyethyl cellulose is in the range of 0.15 to 0.6, the concentration employed can be in the range of 1% to 9% based on the dry weight of the formulation. Due to the superior water-binding capacity of the cellulose derivative having an M.S. in the range of 0.6 to 1.2, the concentration of the additive which is effective can be about 0.5 to 1.5% based on the total dry weight of the formulation. Thus, the concentration of the additive can be about 0.5 to 9% based on the total dry weight of the formulation. Employing conventional joint cement recipes, the additional weight of asbestos, not replaced by cellulose derivative, is replaced by additional limestone or mica so that the total weight of product remains the same.

30 As suggested previously, it is important that the hydroxyethyl cellulose be in fibrous form. For best results the fiber length should be between about 0.03 and 0.007 inch. If the fiber length becomes too great, the resulting cement composition is curdy and not satisfactory. On the other hand, if the fibrous form is lacking, the water-binding capacity of the hydroxyethyl cellulose is not sufficient to reproduce the properties of conventional joint cements.

35 In some cases, the hydroxethyl cellulose alone can give the composition sufficient body for application to a vertical wall without sagging or melt-down. In other cases, a structure additive can be added to increase the body to the necessary level. Materials useful as structure additives for this purpose include, e.g., cellulose fibers in various forms, treated clays, and porous stone flour. When structure additives of this type are added, they normally replace a portion of one of the inert fillers, i.e., limestone, mica, or clay.